

1.0 INTRODUCTION

King County has initiated environmental studies on the northern King County and southern Snohomish County portion of the nearshore environment of Puget Sound. The purpose of this study is to support the siting of a new wastewater treatment plant outfall and to gather information in support of a King County Wastewater Treatment Division Habitat Conservation Plan for salmon and other species. A fundamental aspect of this study is the development of maps that document the types and locations of aquatic habitats and fisheries resources within the nearshore environment of the study area (see Section 1.2). These maps will provide a critical basis for assessment of the quality of the environment for a variety of aquatic resources including salmonids, crabs, flatfish, geoduck, rockfish, birds and marine mammals. The information could also be used in the development of restoration scenarios for the area.

The primary emphasis of this report is the documentation of methods used to map the nearshore environment in northern King County and southern Snohomish County, as well as presentation of the data collected in the form of maps and summary tables of substrate, vegetation, fish, and macroinvertebrates.

1.1 Objective

The objective of this study is to provide accurate, georeferenced maps of benthic habitats in the study area to assist in the siting of a new wastewater treatment plant outfall and assessment of habitats of endangered, threatened, and economically important species. The mapping was conducted in the fall of 1999 using two complementary techniques: side scan sonar and underwater videography. Products derived from these techniques include geographic information system (GIS) compatible polygon data of

substrate type and vegetation cover including eelgrass and kelp. Additional GIS overlays include underwater video track line data of total macroalgae, selected macroalgal species, fish, and macroinvertebrates.

This report provides the details of the methods and a summary of the findings from the study. Copies of the maps are included in this report in an appendix. Digital copies of all maps have been provided to King County along with copies of the videotapes. Specific products provided to King County either in this report or previously are as follows:

- 1) maps of benthic surface sediment types
- 2) maps of submerged aquatic vegetation and other features (e.g., pilings, debris piles)
- 3) estimates of the area covered by each of these features
- 4) spatial maps of fish and macroinvertebrates observed in the videography
- 5) a brief written analysis and summary of the information, and
- 6) an evaluation of the effectiveness of the methods as habitat assessment tools.

1.2 Study Area

The study area covers approximately 28 km of shoreline in the central basin of eastern Puget Sound between Shilshole Marina in Seattle and Picnic Point, located slightly north of Edmonds (Figure 1). The habitat area mapped was approximately 22 linear km of nearshore environment from the water line (ranging between +1 m and +3 m mean lower low water [MLLW]) to a depth of approximately -30 m MLLW. The overall upland environment is varied and includes residential housing, county parks, marinas, and industrial areas with piers extending into the nearshore zone. Most of the shoreline

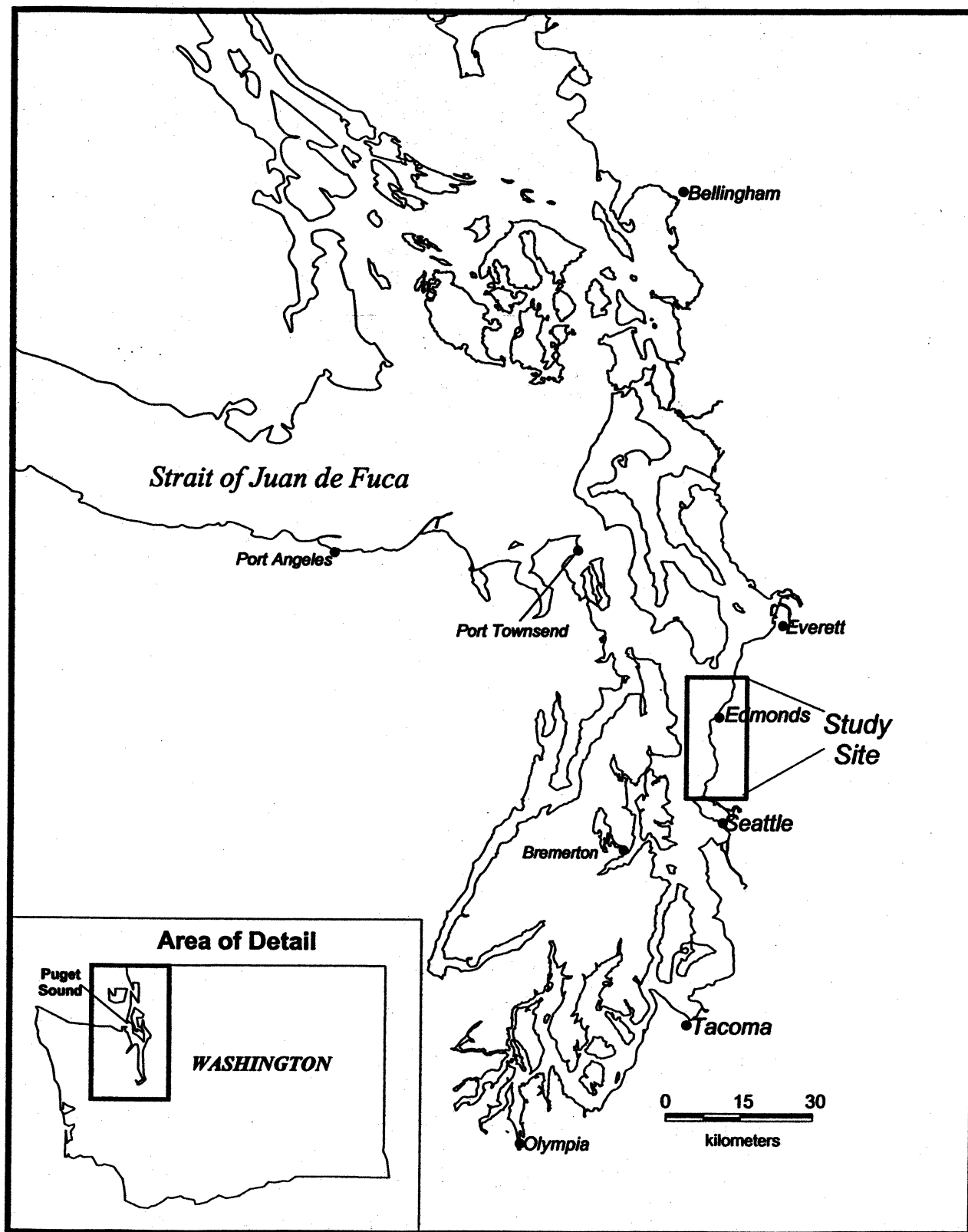


Figure 1. Location of study site in Puget Sound, Washington.

has been altered by the railroad construction at the base of moderately steep bluffs.

Several areas within our study site were excluded from the mapping effort for logistical reasons, including the Edmonds Marina, the Edmonds Ferry dock and the Edmonds Underwater Marine Park. For ease of field collection and data reporting, we divided the study site into 12 discrete areas labeled A through L from the north to the south (Figure 2). Areas ranged from less than one kilometer to approximately 3 km in length.

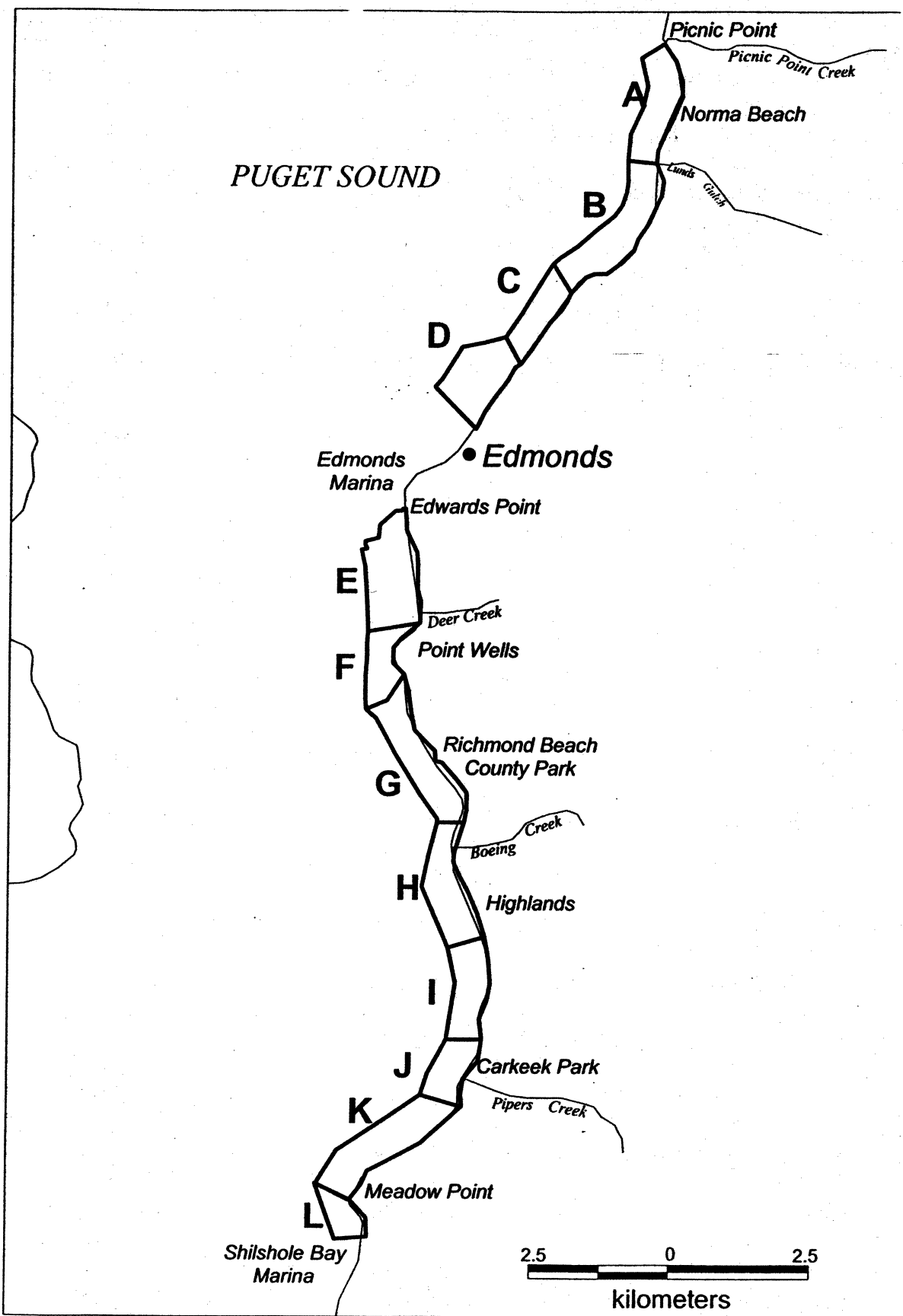


Figure 2. Locations of study Areas A-L within the Puget Sound study site.

2.0. METHODS

The methods discussed in this section include a description of the field survey design and instrumentation used to collect the habitat assessment data (i.e., the navigation system, side scan sonar, underwater video, bathymetry and diver surveys). The data analysis component includes a description of the video post processing methodology, the associated classification scheme and codes used, quality assurance and quality control of the video data, and integration of the side scan sonar and video data into GIS map products.

2.1 Field Collection

A majority of the survey was conducted on the 28' *R/V Strait Science*, a vessel owned and operated by the Pacific Northwest National Laboratory (PNNL). Surveys were conducted between October 6, 1999 and November 14, 1999. Navigation survey software and a global positioning system (GPS) were coupled to a side scan sonar system and an underwater video platform (used at separate times) to collect spatially referenced data for nearshore habitat mapping. Figure 3 shows a schematic of the system; a description of the components is discussed below. A portion of the survey (underwater video data collected along track lines perpendicular to shore) was conducted by Marine Resource Consultants (MRC) of Port Townsend, using the *R/V Brendan D II*.

2.1.1 Survey Design and Navigation System

The baseline tidal datum used for this study was MLLW. Mean high water (MHW), 10.06' above MLLW at 47°48.8' N and 122°23.0' W, was digitized into twelve sub-areas (Areas A – L) from 7.5-minute USGS topographic maps. These digitized shoreline files were imported into HYPACK Hydrographic Survey Software and used as